

WASHINGTON DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
FRESHWATER MONITORING UNIT
STREAM DISCHARGE TECHNICAL NOTES
MANUAL STAGE HEIGHT STATION

STATION ID: 45B070
STATION NAME: Icicle Creek near Leavenworth
WATER YEAR: 2008
AUTHOR: Tyler W. Burks

Introduction

Watershed Description

Icicle Creek originates in the snowfields of the eastern slopes of the central Cascade Mountain range and flows into the Wenatchee River at the City of Leavenworth. The watershed is bounded by both the Stuart Range and the Chiwaukum Mountains. Land cover above the gage consists of predominantly coniferous forest but also includes alpine shrubland, montane grassland, bedrock/talus slopes, and riparian woodlands of the Wenatchee National Forest and Alpine Lakes Wilderness Area. Mean annual precipitation across the watershed above this gage location is 82.3 inches (U.S. Weather Bureau, 1965).

Gage Location

Observation of the manual stage height stream gaging station on Icicle Creek began on May 3, 2007. The gage is located at the East Leavenworth Road bridge on the right bank, approximately one half mile downstream of the Leavenworth National Fish Hatchery Complex.

Table 1.

Drainage Area (square miles)	211 (USGS, 2012)
Latitude (degrees, minutes, seconds)	47° 33' 49" N
Longitude (degrees, minutes, seconds)	120° 40' 04" W
Primary Gage Index Type	Staff Gage
Secondary Gage Index Type	Tape Down

Error Analysis

Overall Rating Error Percentage	10.1%
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Rating Table(s)

Table 2. Rating Table Summary

Rating Table No.	1		
Period of Ratings	5/2007-10/2012		
Range of Ratings (cfs)	47-9230		
No. of Defining Measurements	38		
Rating Error (%)	10.1%		

Narrative

Rating Table #1 applies to the current period of record at this station. It has evolved slightly with the addition of new measurements, but, overall has continued to be persistent. The rating has been logarithmically extended to cover one half the lowest measured discharge and two times the highest measured discharge.

Discrete Flow Record

Table 3. Discrete Flow Record Summary

Number of Discrete Stage Readings	90	
Maximum Observed Stage (feet) and Date	11.46	05/18/2008
Maximum Predicted Discharge (cfs) and Date	5920	05/18/2008
Minimum Observed Stage (feet) and Date	1.98	09/17/2008
Minimum Predicted Discharge (cfs) and Date	93	09/17/2008
Range of Stage (feet) and Discharge (cfs)	1.98 to 11.46	93 to 5920

Narrative

Staff gage observations were made by the Chelan County Natural Resources Department on a bimonthly basis beginning in October 2007. The data set was significantly augmented by USFWS volunteer Dick Rieman, who collected data on a daily basis during significant flow events. Five discharge measurements were made during the water year, ranging from 93 to 4610 cfs. Based on continuous data collected by the USGS at Icicle Creek above Snow Creek, near Leavenworth (12458000), the peak discharge was closely captured for the water year on May 18, 2008. It is likely, however, that our magnitude is lower, due to the timing of our manual observation. The peak discharge observed during the water year was a case where the staff gage was submerged. The stage observations were back-calculated from a regression of staff gage and tape-down observations made from the bridge. The regression yielded an $r^2=0.97$.

Modeled Discharge

Table 4. Model Summary

Model Type (Slope conveyance, other, none)	---
Range of Modeled Stage (feet)	---
Range of Modeled Discharge (cfs)	---
Valid Period for Model	---
Model Confidence	---

Surveys

Table 5. Survey Type and Date (station, cross section, longitudinal)

Type	Date
Station Levels	10/09/2007

Activities Completed

The first set of gaging station survey levels were completed on 10/09/2007. On this date, reference marks #1 and #2 were installed. The tape-down washer was also surveyed. Elevations established at these locations are relative to the preexisting staff gage.